

1974

Approved For Release 2005/01/11 : CIA-RDP88-01314R000100470025-7

deed, the three or four major relevant studies available by 1970 revealed small average gains in population performance over 30 or 40 years in these countries. It is probable that the gains reflect social and environmental improvement rather than genetic change.

Beneficial effects of superior environment and opportunity on measured intelligence seem to be shown in studies of U.S. blacks. Average IQ scores were higher among blacks in New York and Illinois than among whites in the economically poorer Southern states of Mississippi and Georgia. Although some of this effect was attributed to selective migration, average score among the northern blacks also was consistently related to length of residence in Northern states.

Efforts to compare national and racial groups chronically have faced the problem of designing appropriate tests. Although some cognitive tests are undoubtedly more "culture-fair" than others, cultural and environmental differences are so complex (P.E. Vernon, 1969) that test constructors with claims to know "culture-fair" characteristics should be treated with skepticism. Even within one culture it is extraordinarily difficult to devise measures that are acceptably "fair" to all social groups and that at the same time are effective indicators of intelligence. Since verbal skills tend to be particularly susceptible to early deprivation and environmental handicap, nonverbal tests seem to provide a most limited solution.

Development and decline of intelligence. Predictive estimates of intelligence in later life can be made with a fair degree of success at about the age of four or five, but little earlier. B.S. Bloom (1964) estimated that about 50 percent of variation in intelligence at age 17 is predictable at age four. Research into native language acquisition in infancy was active in the 1970s, revolutionized by progress in psycholinguistics, and was expected eventually to influence developmental theories of intelligence.

Measures of general intelligence proved serviceable for predicting a variety of performance over the lifespan, as shown by Terman's massive studies, but the measures are too crude for detailed accounts of development. Nevertheless, developmental curves for separate test components differ markedly; for instance, verbal scores on the Wechsler Adult Intelligence Scale typically remain fairly constant throughout adult life, particularly among high scorers (whose verbal skills may increase up to late middle age), while average Wechsler performance scores decline with increasing steepness between ages 20 and 60.

As long as enough time is allowed, problem-solving ability tends to deteriorate relatively little before old age, but speed in dealing with unfamiliar problems drops sharply. This difference appears to be closely associated with a diminishing scope of attention and decline in short-term memory span. Persons who show higher intelligence in early life tend to hold up best, curves of high and low scorers fanning out more widely with increasing age.

These statistical trends from intelligence testing have been enriched by the clinical methods of Jean Piaget, in which cognitive development among children is intensively studied. In some respects this *méthode clinique* is relatively subjective and is limited to comparatively small samples of subjects.

The theories of Piaget. Piaget's work produced an overall picture of human cognitive development up to adolescence, as contrasted with earlier piecemeal analyses of individual differences. His theory is a unique effort to synthesize biology and epistemology. Problems in epistemology (e.g., how people can think of a perfect circle when they have never seen one) were a classic concern of philosophers, who generally knew little about early cognitive development. Piaget's approach was to tackle such problems by detailed observation of individual children.

He concluded that intelligent behaviour depends on an initially precarious, increasingly stable equilibrium between contrasting intellectual functions that he called

assimilation and accommodation; ev passes through specifiable phases of ment in a fixed order that correspond to chronological age: such development in that each phase incorporates rath those preceding; the cognitive structur can be described in terms of mathem lattices.

While much of this work is highly to means easy to follow, Piaget's concep changes in cognitive performance won wide acceptance. Numerous cross-cultural studies later lent support to the general applicability of Piaget's findings.

The influence of computers. The already considerable influence of high-speed computers in the study of intelligence seems likely to increase. Beyond the enormous computational facilities they provide, such computers are of value in generating mathematical models of intelligence and in simulating complex cognitive performance. Even in its infancy, the study of machine intelligence has produced striking results.

Computers already can play checkers (draughts) better than their programmer. They can give correct answers to items from intelligence tests that are difficult enough to be useful in the selection of university students. More general computer programs serve to solve a very wide range of logical problems; for instance, these machines discover proofs of geometrical theorems.

Computer developments by the 1970s had not produced any single widely accepted theory of intelligence, but current ideas about brain mechanisms are expressed with growing frequency in cybernetic terms, offering close analogies to computer operation. Systematic trial-and-error loops in computer programs are clearly similar to human processes in solving problems and in testing hypotheses. Individual differences in intelligence are coming to be expressed in such computer terms as basic speed of operations, quick access to memory storage, number and complexity of programs or schemata on file, and adequacy of programming language.

BIBLIOGRAPHY. The pioneer work of Binet is well summarized in J.W. REEVES, *Thinking About Thinking* (1965). Early statistical views are described in C.E. SPEARMAN, *The Abilities of Man* (1927). A useful summary of early U.S. research into intelligence and of the development of major theories is by R.D. TUDDENHAM in L. POSTMAN (ed.), *Psychology in the Making* (1961). An excellent survey of the logic and principles of factor analysis is provided in C.L. BURT, *The Factors of the Mind* (1940). A comprehensive account of a multifactorial theory of intelligence is in J.P. GUILFORD, *The Nature of Human Intelligence* (1967). An eclectic overview of the literature, including that on creativity and on machine intelligence is provided by H.J. BUTCHER, *Human Intelligence* (1968), and in BUTCHER and D.E. LOMAX, *Readings in Human Intelligence* (1971). Other useful collections of readings are S. WISEMAN (ed.), *Intelligence and Ability* (1967); and L.E. TYLER (ed.), *Intelligence: Some Recurring Issues* (1969). Accounts emphasizing the importance of heredity are by A.R. JENSEN, "How Much Can We Boost IQ and Scholastic Achievement?," *Harvard Educational Review*, 39:1-123, 449-83 (1969); and of cultural and environmental influences by J.MCV. HUNT, *Intelligence and Experience* (1961); and P.E. VERNON, *Intelligence and Cultural Environment* (1969). A definitive summary of Piaget's earlier work is in J.H. FLAVELL, *The Developmental Psychology of Jean Piaget* (1963).

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Intelligence and Counterintelligence

Intelligence means, basically, evaluated information. As used in this article it denotes a wide variety of governmental activities related to national security and foreign policy. A statesman's day often begins and ends with the reading of intelligence reports. While accurate information may not guarantee an optimum decision, incorrect or inadequate information has demonstrably caused disaster. Thus it is not enough that accurate information exists somewhere in government files: such information must be available at the right time.

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